SECTION 102 - EXCAVATION AND EMBANKMENT

1. GENERAL

Work under this section consists of excavation for manholes; excavation and bank filling for structures; excavation and embankment for channels and dikes; and grade changes for roads, sidewalks, alleys, and streets. The work includes disposal of excess excavated materials, waste materials, and all debris necessary to permit construction of the various items in the project; and all miscellaneous and incidental work in connection with excavation and embankment to the lines and grades shown on the drawings and in accordance with these specifications.

2. SITE PREPARATION

Trees, shrubs, heavy growth of weeds or other vegetation, sod, and other debris shall be removed from the area where construction is shown; such removal may be by burning, stripping, or other satisfactory methods as authorized by the Engineer. Strippings, large roots, and other debris shall be transported off the site of construction and not incorporated in, or covered by, backfills or embankments.

3. SURFACE DRAINAGE

Surface drainage shall be diverted away from open excavations prior to completion of the work therein. The Contractor shall remove surface water which accumulates in excavations and shall restore the subgrade to original bearing values at no additional expense to the Owner.

4. SHORING AND BRACING

The Contractor shall furnish and install all shoring, bracing, and blocking required to preserve and maintain exposed excavation faces, to protect existing facilities, and to provide for the safety of his workmen and the general public.

5. MANHOLE EXCAVATION

Excavation for manholes shall be cut sufficiently outside the neat lines of the structure to allow for all construction, installation of piping, and for inspection; but in no case shall the excavation be more than two (2) feet outside the neat, vertical lines of the manhole. Care shall be taken to prevent overdepth excavation, except as ordered by the Engineer for removal of unstable subgrade material. Any overdepth excavation shall be filled with concrete or with approved backfill material; no extra payment will be made for such additional concrete or subgrade restoration.

6. STRUCTURE EXCAVATION

Excavation for structures shall be cut sufficiently outside the neat lines of the structure to allow for all construction and installation including forms and falsework, connection of piping, and for inspection. Care shall be taken to prevent overdepth excavation except as ordered by the Engineer for removal of unstable subgrade material. Any overdepth excavation shall be filled with concrete or with approved backfill material; no extra payment will be made for such additional concrete or subgrade restoration. Subgrade under slabs may be topped out with sand if entirely confined and placed to prevent displacement under pressure. Sand shall be not less than two (2) inches in depth, screened to grade, completely dry or inundated, and covered with waterproof membrane.

7. STRUCTURE BACKFILL

After completion of construction below original ground surface, all forms, shoring, and bracing shall be removed and the excavation cleaned of trash and debris. Material for structure backfilling shall consist of approved material from the excavation or from borrow sources and shall be free from trash, lumber, and excessive amounts of organic matter. The backfill material shall be placed in layers or lifts, and each layer shall be uniformly compacted to a density not less than that of adjacent undisturbed earth. Water settlement may be used only if proper compaction can be obtained by this method, and provided that proper precautions are taken to prevent displacement of the structures by buoyancy when submerged in water.

8. COMPACTED FILLS AND EMBANKMENTS

Fills and embankments shall be constructed of approved materials and shall be compacted by rolling, tamping, or other methods approved by the Engineer, until the entire fill has attained a density equal to the specified compaction limits. Embankments shall be placed in layers, not to exceed six (6) inches prior to compaction; and shall have a moisture content not less than three (3) percent below optimum moisture content for the material used, and not more than three (3) percent above the optimum. Compacted density of the soil shall be equal to or greater than 95% of maximum compaction at optimum moisture content. The top soil shall be stockpiled and used as a finish topping for the embankments so that seeding can be done. If sand lenses or layers are encountered at the finish grade, the lenses or layers shall be excavated a minimum of 12 inches below finish grade and backfilled with approved material.

9. SITE GRADING

Upon completion of the excavation and construction of the compacted embankments, the entire site of the work shall be graded to smooth uniform slopes. Embankments shall be graded and shaped to the typical sections shown on the drawings. Waste areas shall be broken down and rough graded, presenting no obstructions to natural drainage.

10. SUBGRADE TREATMENT

A. Preparation. The subgrade shall be brought to lines, grades and typical section shown on the plans as herein-after described. All soft and yielding material and other portions of the subgrade which will not compact readily when rolled or tamped, shall be removed and all loose rock or boulders found in the earth excavation shall be removed or broken off to a depth of not less than six (6) inches below the surface of the subgrade. All holes or depressions made by the removal of this material shall be filled with approved material and the whole subgrade brought to line and grade and compacted. If the surface of an old stone, gravel or bituminous roadbed conforms approximately to the surface of the finished subgrade, where reconstruction of the base course is not provided for, it shall be scarified as directed, to a uniform depth and for the full width of the subgrade surface, to a depth sufficient to eliminate all depressions and to permit uniform reshaping. Minimum depth of scarification shall be six (6) inches.

B. Compaction. Compaction density of the soil shall be equal to or greater than 95 percent maximum compaction at optimum moisture. The entire subgrade shall be thoroughly compacted by rolling with sheepsfoot rollers or tandem power rollers. Any

portion of the subgrade that is not accessible to a roller shall be compacted thoroughly with hand tampers. The rolling and tamping operations shall include adequate handling to prevent ridges or depressions in the finished subgrade.

The moisture content of the soil at the time of compaction shall not be lower than three (3) percentage points below the optimum moisture content nor higher than three (3) percentage points above the optimum moisture content of the soil involved. When sufficient moisture does not exist in the soil or earth material to provide thorough bonding under rolling, a sufficient amount of water shall be added to the soil before it is rolled or tamped to insure thorough bonding during the compacting process. Areas outside the limits of the roadway curb and gutter and driveway entrances shall be Type B MR90 compaction.

Upon completion by the owner of the appropriate compaction density and moisture content tests, the Contractor must place the pavement within five (5) calendar days. If the pavement is not placed within five (5) calendar days, additional compaction and moisture tests will be required.

11. CLASSIFICATION

All excavation shall be unclassified and shall include any and all materials encountered during construction. The Contractor shall obtain additional information to satisfy himself that his proposal includes all costs which may be incurred in the excavation required for the project.

12. TESTING

The Contractor shall, at his own expense, employ a firm qualified to make soil compaction tests and furnish the Engineer a certified copy of all tests made on city improvement projects. These tests shall be taken at all areas where compaction is required.

The Engineer shall determine the location and number of compaction tests that shall be required.